

The missing males of *Ramuliseta* Keiser (Diptera: Schizophora: Ctenostylidae)

by

D. A. Barraclough

(Natal Museum, P. Bag 9070, Pietermaritzburg, South Africa;

e-mail: dbarracl@nmsa.org.za)

ABSTRACT

Ramuliseta is revised to include three species restricted to the Old World tropics. One new species, *R. ashleyi*, based on males only, is described from Sulawesi, Indonesia, although only provisionally placed in *Ramuliseta*. *R. lindneri* Keiser, 1952 (Africa), is newly synonymised with *R. palpifera* Keiser, 1951 (Indonesia). The first male of *R. palpifera* is described from Nigeria; details of marked sexual dimorphism, relating particularly to the head, are documented. A key to the three species of *Ramuliseta* is presented. The male terminalia of *R. ashleyi* and *R. palpifera* are described in detail. The placement of the Ctenostylidae in the Tephritoidea is briefly discussed.

INTRODUCTION

Ctenostylidae are a rarely encountered family of acalyptrate Diptera, provisionally placed in the Tephritoidea (D. K. McAlpine 1990, Barraclough 1994). At present the described fauna (including taxa treated in this paper) includes nine species and six genera: *Nepaliseta* Barraclough (Nepal, monotypic); *Ramuliseta* Keiser (Africa, Madagascar, Indonesia, three species); *Furcisetia* Aczél (Brazil, monotypic); *Tauroscypson* Curran (Guyana, monotypic); *Lochmostylia* Hendel (Costa Rica and Brazil, two species); *Ctenostylum* Macquart (Brazil and Costa Rica, monotypic).

This paper is a sequel to my 1994 work, which reviewed the afrotropical species of *Ramuliseta*. At that stage no males of *Ramuliseta* were known and I speculated that the genus may be parthenogenetic. The discovery and description of males of two *Ramuliseta* species (see below), including that of *R. palpifera* Keiser, 1951, is thus an important contribution to our meagre knowledge of the Ctenostylidae. In *R. palpifera* there is a remarkable degree of sexual dimorphism in the structure of the frons, antenna, eye, facial region including the facial carina, and also in head shape (see below).

A point of particular interest is the presence of a very elongate distiphallus in *R. ashleyi* sp. n. (Figs 8 & 9), unlike that of all other known Ctenostylidae, in which the distiphallus is papilliform (D. K. McAlpine 1990: 368). In addition, males of both *Ramuliseta* species described below lack a differentiated T6, and S6 is a reduced, apparently symmetrical, strip-like structure. In males of Ctenostylidae seen by D. K. McAlpine (1990), a well-developed T6 and S6 were reported. The reduction, in males of *Ramuliseta*, of the sclerites of segment 6 to a slender S6 only, although not

homologous with the condition in Tephritoidea (see D. K. McAlpine 1990: 369), is nevertheless found elsewhere in the superfamily. For example, in some species of *Dasiops* Rondani (Lonchaeidae) S6 is sometimes symmetric, separate and ventrally positioned (J. F. McAlpine 1987: 795). I have, based on the structure of the male postabdomen and terminalia of *Ramuliseta*, been unable to find any evidence suggesting that Ctenostylidae should be removed from the Tephritoidea, and placement in the superfamily seems appropriate at present.

MATERIALS AND METHODS

Specimens of *Ramuliseta* examined are from the following depositories (acronyms in parentheses):

Natal Museum, Pietermaritzburg, South Africa (NMSA)

National Museum and Gallery of Wales, United Kingdom (NMWC)

Natural History Museum, Basel, Switzerland (NHMB)

Holotype label data are quoted verbatim, with supplementary information in square brackets; a slash denotes the end of a line of print and a semicolon separates different labels.

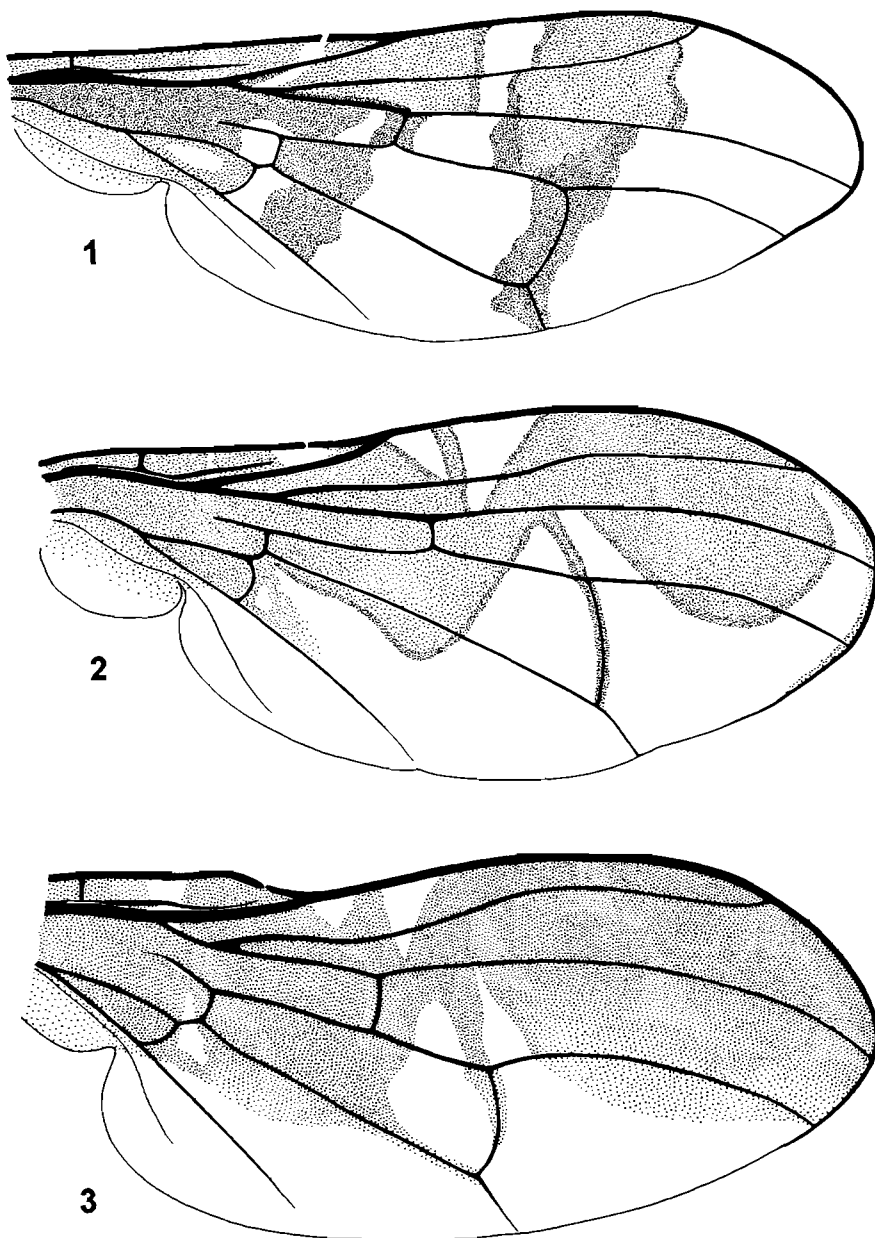
The entire abdomen was detached and macerated in warm to hot 80–85 % lactic acid, and then rinsed in alcohol. Dissected terminalia were positioned in glycerine jelly for drawing. Dissected terminalia and associated abdominal parts were stored in glycerine in a microvial pinned beneath each source specimen.

Bilaterally symmetrical structures are described in the singular. Head/thorax length was measured from the anterior margin of the third antennal segment to the abdominal base. Wing length was measured from the humeral crossvein to the wing tip. The measurements of the holotype are given in brackets after the range for other specimens examined.

TAXONOMY

Key to World species of *Ramuliseta*

- 1 Wing (Fig. 1) with complete, albeit irregular, transverse hyaline streak just beyond mid-length. Vein R_{2+3} reaching costa just beyond mid-point between R_1 and R_{4+5} , well short of wing apex, distance along costal margin between R_{2+3} and R_{4+5} about 3.0 times distance between R_{4+5} and M_1 . [Sulawesi Utara, Indonesia] **ashleyi** sp. n.
- Wing without complete transverse hyaline streak just beyond mid-length. Vein R_{2+3} reaching costa well beyond mid-point between R_1 and R_{4+5} , nearer to wing apex, distance along costal margin between R_{2+3} and R_{4+5} less than 2.0 times distance between R_{4+5} and M_1 2
- 2 Wing as in Fig. 3: costa with prominent outward flexure prior to subcostal break; cells r_{2+3} and r_{4+5} predominantly brown infuscate apically. [Southern, East and West Africa; Lesser Sunda Islands, Indonesia] **palpifera** Keiser, 1951
- Wing as in Fig. 2: costa without outward flexure prior to subcostal break; cells r_{2+3} , and more noticeably r_{4+5} , hyaline apically. [Madagascar] **madagascariensis** Hennig, 1960



Figs 1–3. *Ramuliseta* wings, showing venation and patterning (none sexually dimorphic); all vestiture omitted. 1. *R. ashleyi* sp. n. 2. *R. madagascariensis* Hennig. 3. *R. palpifera* Keiser.

Ramuliseta ashleyi sp. n.

Figs 1, 4–5, 8–10

Etymology: Named for Mr Ashley Kirk-Spriggs, collector of the type series.

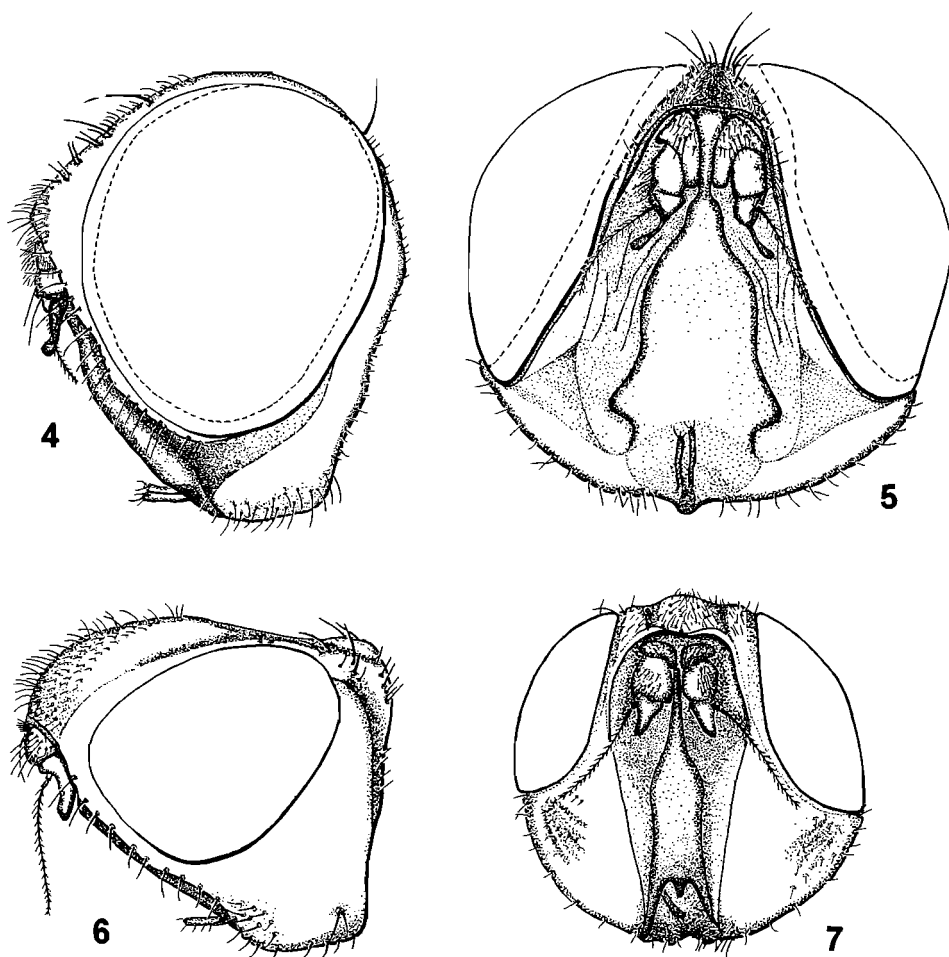
Holotype ♂: INDONESIA: 'Light trap / sample'; 'SULAWESI UTARA: / Lake Mala. [Danau Moyat] 0°44'N, / 124°27'E, 1080m. / 14.viii 1985. / A.H.Kirk-Spriggs.'; 'NMW Indonesia / Expedition 1985 / (Project Wallace) / NMW.Z. 1985.078' [text on venter of label]; 'HOLOTYPE ♂ / *Ramuliseta* / *ashleyi* / Barraclough, 1998' [rectangular card, red perimeter]. In good condition; in NMWC.

Description: Male: Dimensions (in mm): Head/Thorax length 3.1–3.2 [3.1]; wing length 4.2.

Colouring/Pollinosity: Head colour variably brown; frons distinctly yellow-brown; occiput slightly darker brown on upper half (except medially), otherwise a translucent cream to very pale yellow; cheek mostly darker brown; facial carina medium brown, but adjacent antennal grooves darker brown; parafacial yellow-brown; antenna yellow-brown to brown, but apex of third antennal segment distinctly orange; lunula darker brown; eye mainly dark reddish brown, but entire periphery contrastingly pale yellow in both specimens and this pale colouring almost certainly not artefactual (Figs 4 & 5); palpus dark yellow to medium brown; pollinosity indistinct and silver, most visible on cheek, and especially facial carina and adjacent grooves. Thorax variably coloured, mainly medium to darker brown, colour apparently affected by greasiness and position of muscle insertions, pleuron darker brown postero-dorsally and posteriorly, mesonotum with paired median vittae (narrow and dark) visible at certain angles, as are much broader sublateral vittae which are evident postsuturally only, all bristles yellow; haltere knob medium to dark brown, stem slightly paler; pollinosity sparse and silver on pleuron, yellow and more profuse on mesonotum (visible at certain angles only). Legs entirely yellow-brown, but mid coxa sometimes slightly darker. Wing hyaline, but with extensive and characteristic brown infuscation, although with complete, albeit irregular, hyaline transverse bands across wing at about mid-length and apically respectively (Fig. 1), brown infuscation noticeably paler between R_{4+5} and anterior wing margin. Abdomen medium brown, although apical segments somewhat darker; pollinosity not evident.

Head (Figs 4–5): Profile as in Fig. 4. Profrons reasonably prominent in profile, much more conspicuous than postfrons. Parafacial with lower half concealed or narrowly exposed in profile, with elongate, serial, pale setulae extending to lower margin of eye, longest setulae about half length of arista. Eye enlarged, being markedly more extensive posteriorly and ventrally in profile, longest diameter slightly anteroventrally directed, ommatidia noticeably larger postero-dorsally. Frons reduced as eyes closely approximated, point of closest approximation about three-fifths distance between anterior and posterior margins, distance separating eyes here about half width of first antennal segment; anterior half of frons shallowly excavate medially. Frons bristles greatly reduced and erratically developed: 1 convergent pair on upper occiput below position of vestigial ocellar triangle; 1–2 pairs of proclinate fronto-orbitals and short frontals along margin of mesofrons; mesofrons with short

setulae on anterior one- to two-fifths. Eye depth in profile about 3.0 times antennal length. Lunula reduced, only narrowly exposed dorsally. First antennal segments moderately separated by slender upper extent of facial carina, inner lobe of each segment extended downwards along margin of carina, each segment mostly covered with profuse, mainly dark, setulae. Second antennal segment reduced, about half to two-thirds maximum width and length of first segment, dorsal surface covered with slightly paler setulae, one or two much longer ventrally directed setulae reaching 1.5–2.0 times length of entire segment. Third antennal segment greatly modified, basal two-fifths of same width as second segment, but thereafter dramatically narrowed into a narrow, finger-like extension with slightly expanded, terminally rounded, apical region; arista emerges from obvious dorsal cleft in upper part of broader section of third segment; arista pubescent (pale hairs), length reaching about



Figs 4–7. *Ramuliseta* species, male heads, profile and frontal views. 4–5. *R. ashleyi* sp. n.; dashed lines around eye periphery denote paler colouring of ommatidia adjacent to eye margin. 4. Profile. 5. Frontal view (vestiture on parafacials omitted). 6–7. *R. palpifera* Keiser. 6. Profile. 7. Frontal view (vestiture on parafacials omitted).

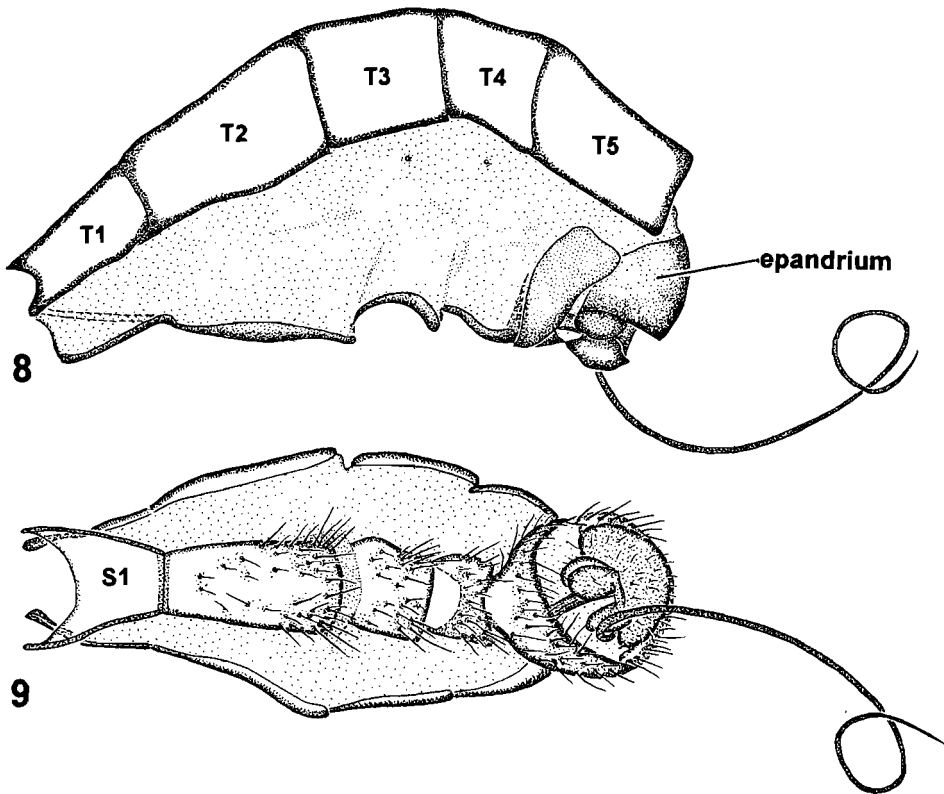
1.5 times that of third antennal segment. Antenna inserted just above eye centre in profile. Facial carina much broader ventrally (width here about 1.5–2.0 times length of third antennal segment), anterior surface flat and obviously visible in profile, excavate ventrally and partially continuous with buccal cavity; grooves adjacent to carina deeply excavate, extending downwards and backwards virtually to lower margin of eye. Cheek depth slightly less than length of antenna.

Thorax: Propleuron without any vestiture. Mesopleuron with mainly pale setulae concentrated on posterior half, setulae progressively longer towards posterior margin. Sternopleuron with 3–4 short, pale, inconspicuous setulae. Pteropleuron with fairly dense cluster of pale setulae. Mesonotum with short yellow hairing on posterior three-fifths; bristles: 1 pair notopleurals, 1 pair dorsocentrals (positioned halfway between transverse suture and scutoscutellar suture), 1 pair postalars, 3 pairs marginal scutellars (apical pair sometimes divergent). Hind tibia virtually straight along entire length, but noticeably narrowed to about two-thirds normal width at about basal third.

Wing (Fig. 1): Costa without outward curvature just prior to subcostal break. R_1 with serial setulae along most of length, these slightly clustered at position of subcostal break. R_{2+3} virtually straight except apically, distance from costal margin at a maximum near mid-length, not much closer to costal margin along apical half, insertion on costa well short of wing apex, distance along costal margin between R_{2+3} and R_{4+5} about 3.0 times distance between R_{4+5} and M_1 . Crossvein r-m positioned at basal two-fifths to three-sevenths of discal cell, meeting M_1 at a noticeably acute angle. First basal cell open anteriorly along basal three-fifths. Appendix of CuA_1 short, length one-quarter to one-third length of crossvein dm-cu. Anal cell with posterodistal corner not receded.

Abdomen (Figs 8–10): Vestiture comprises short, yellow setulae, this largely sparse or absent on basal 2 segments. Terminalia exerted and rotated about 45° clockwise. Sternite 1 not X- or V-shaped, apical two-thirds sclerotised and without vestiture, basal margin quite strongly arched (Fig. 9). T5 without dark metallic spot as in *R. palpifera*. Shape of tergites as figured, T2 unusually elongate, being at least 1.5 times length of each of the other tergites. S5 laterally expanded, width about 2.5 times that of S4 in ventral view, lateral lobes extend upwards towards ventral margin of T5. Segment 6 represented only by much-reduced, symmetrical, slender, strip-like S6, mostly obscured beneath distal margin of S5.

Terminalia (Fig. 10): Epandrium well developed, not displaced behind reasonably closely associated cerci and surstyli. Cerci appearing partially fused and with relatively profuse and elongate setulae. Surstylus positioned beneath cercus in profile, being a relatively rotund elongate-ovoid lobe about 1.5 times length of cercus, connected posteriorly (behind cerci) by a slender band, setulae over much of surface. Hypandrium not evident (terminalia not dissected free from abdomen), if present then greatly reduced. Aedeagal apodeme slender, about three-quarters length of epandrium. Distiphallus evident *in situ* in undissected abdomen, slender and hair-like, although slightly broader basally, not coiled *in situ*, length almost twice that of T5. Ejaculatory apodeme unusually well developed, subequal in length to epandrium, strongly sclerotised nodular region with broader, fan-like distal section.



Figs 8–9. *Ramuliseta ashleyi* sp. n., male abdomen and postabdomen (indication of variable colouring of sclerites not indicated). 8. Abdomen, lateral view, showing position and development of tergites and terminalia (vestiture omitted); note elongate distiphallus. 9. Abdomen, ventral view, showing position and development of sternites (including vestiture) and partially rotated terminalia (S6 concealed beneath S5).

Female: Unknown.

Paratype: 1♂, same data as holotype (NMSA).

Discussion: *Ramuliseta ashleyi* differs from congeners in a number of character states, the most significant of these being:

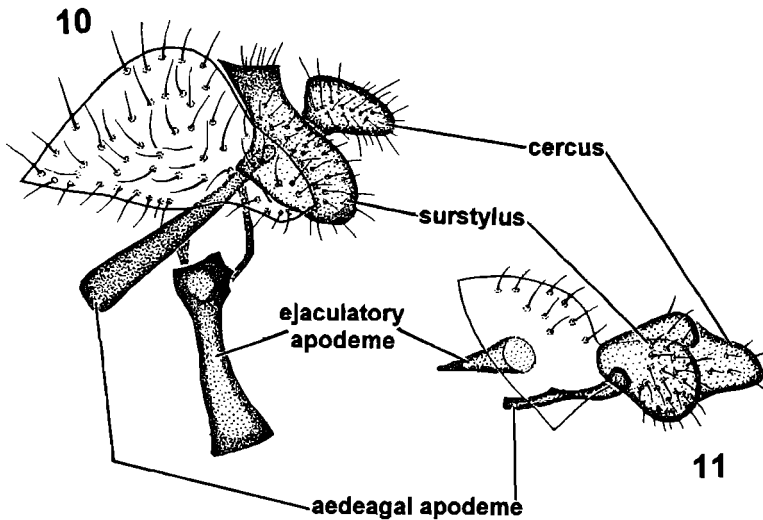
1. Frons greatly reduced and eyes closely approximated in male;
2. Third antennal segment highly modified in male, apical three-fifths narrowed into a slender, finger-like extension;
3. Grooves adjacent to facial carina deeply excavate (?male only), extending downwards and backwards to lower margin of eye;
4. Wing venation and patterning distinctive (see species key, above);
5. Elongate distiphallus present.

I have considerable doubt about the placement of *ashleyi* in *Ramuliseta*, given these differences, but am reluctant to describe a new genus for the species until the

male of *R. madagascariensis* and the female of *R. ashleyi* become known. Only at that stage could a pragmatic assessment of generic affiliations be made. Of the characters listed above, the reduced frons/closely approximated eyes in male *ashleyi* seem particularly discordant with the character states in male *palpifera*, where the frons is not reduced and the eyes not closely approximated. Note that *R. palpifera* may well have an elongate distiphallus; the possibility that it has been detached and lost cannot be ruled out.

The wing patterning and venation of *R. ashleyi* differ strongly from *R. madagascariensis* and *R. palpifera* (see key), but are similar to that of *Nepaliseta mirabilis* Barraclough (see Barraclough, 1995: 137). *N. mirabilis* differs mainly in having a much broader hyaline region on the apical half of the wing, just beyond its mid-length.

According to Kirk-Spriggs (*pers. comm.*) the type specimens were collected at mercury vapour light against a white sheet, shortly after dusk. The light trap was situated on a small hill at the edge of Lake Moyat, and was positioned to sample from a wide area of the lake, including a grassy flood-plain area.



Figs 10–11. *Ramuliseta* species, male terminalia, lateral view (epandrium not stippled). 10. *R. ashleyi* sp. n. (distiphallus omitted). 11. *R. palpifera* Keiser.

Ramuliseta palpifera Keiser, 1951

Figs 3, 6–7, 11

Ramuliseta palpifera Keiser, 1951: 121; Keiser, 1952: 325–327.

Ramuliseta lindneri Keiser, 1952: 325; Aczél, 1956: 34; Hennig, 1960: 326–327; Stuckenberg, 1963: 125–126; Steyskal, 1980: 556; Barraclough, 1994: 9. **Syn. n.**

I have examined the female holotype of *Ramuliseta palpifera* Keiser, 1951 (in NHMB) from the Lesser Sunda Islands, Indonesia, and have (its small size and minor colour differences apart) found it to be identical with the nominal African species, *R.*

lindneri Keiser, 1952. All this material has the same characteristic wing patterning and venation, arisal structure, broad frons, and pinkish body pigmentation. Although the holotype is smaller than all the African material (head/thorax length 2.2 mm, and 2.5–3.3 mm in African material; wing length 2.9 mm, and 3.5–5.1 mm in African material) there can be no justification in treating *lindneri* and *palpifera* as separate species, and *lindneri* is thus here synonymised with *palpifera*.

Description: Male: Dimensions (in mm): Head/Thorax length 2.5; wing length 2.8.

Colouring/Pollinosity: Head colour variably brown and tinged with dark pink; anterior third of frons yellow-brown; occiput mainly yellow-brown, except dark pink dorso-laterally and along upper margin; cheek medium brown to dark pink, although noticeably darker posteriorly; facial carina brown to dark pink, but yellow-brown dorsally between antennae; parafacial yellow-brown, except pink-tinged along anterior margin; antenna entirely yellow-brown; lunula similar in colour to anterior part of frons; eye entirely medium reddish-brown; palpus yellow; pollinosity very indistinct, silver, most visible on facial carina and posterior two-thirds of frons. Thorax mainly yellow to yellow-brown and irregularly tinged with pink; humeral callus yellow; muscle insertions on mesonotum produce appearance of dark yellow, paired median vittae (narrow), and much broader paired sublateral vittae which commence halfway between anterior margin of mesonotum and transverse suture and terminate near scutoscutellar suture; pleuron mainly pink, but yellow-brown anteriorly and posteriorly, and with extensive dark yellow muscle insertions above mid and hind coxae; bristles a mixture of yellow and pale brown; haltere knob dark reddish brown, stem yellow-brown; pollinosity sparse and silver when evident, yellow and more profuse on mesonotum (visible at certain angles only). Legs entirely yellow to yellow-brown, but mid coxa sometimes slightly darker. Wing patterning and infuscation as in female. Abdomen in poor condition and cleared prior to this revision; details of colouring and pollinosity therefore uncertain, although certainly pallid and T5 with a dark ovoid spot positioned anteroventrally on each side (smaller than in female).

Head (Figs 6–7): Subtriangular in profile and strongly receding below (Fig. 6). Profrons strikingly prominent in profile, much more conspicuous than postfrons. Parafacial entirely and well exposed in profile, with short, serial, pale setulae extending to about lower margin of eye, longest setulae about one-fifth length of arista. Eye not enlarged, somewhat ovoid in shape and longest diameter noticeably anteroventrally directed, ommatidia noticeably larger postero-dorsally. Frons not reduced by close approximation of eyes, point of closest approximation about three-fifths to four-fifths distance between anterior and posterior margins, distance separating eyes here about 5.0–6.0 times width of first antennal segment; mesofrons ridged medially along entire length (narrowly posteriorly and broadly anteriorly). Frons bristles greatly reduced and erratically developed: one or two pairs of proclinate fronto-orbitals and very short frontals along margin of mesofrons; mesofrons with short setulae on anterior three- to four-fifths. Eye depth in profile about 2.5 times antennal length. Lunula reduced, only narrowly exposed dorsally. First antennal segments short and virtually contiguous, inner lobe of each segment extending downwards towards margin of carina, each segment mostly covered with profuse, mainly dark, setulae. Second antennal segment of moderate size, more than

twice as long as exposed length of first segment, dorsal surface covered with slightly paler setulae than first segment, one or two longer ventrally directed setulae reaching about three-quarters length of entire segment. Third antennal segment modified, basal quarter to third of same width as second segment, but thereafter markedly narrowed into a slender, forwardly directed section whose apex is acutely pointed; arista emerges dorsally just distad of broad basal section of third segment; arista pubescent (pale hairs), length reaching about 1.5–1.6 times length of third antennal segment. Antenna inserted just below eye centre in profile. Facial carina somewhat broader ventrally (width here about 0.9 times length of third antennal segment), anterior surface flat and just visible in profile, ventral excavation partially continuous with buccal cavity; grooves adjacent to carina shallow and barely visible. Cheek depth about 1.7 times length of antenna.

Thorax: Propleuron with a few dark setulae along anterior margin. Mesopleuron with some dark setulae along posterior margin only. Sternopleuron with 2–3 dark setulae. Pteropleuron with 2–3 separated, dark, setulae. Mesonotum with short yellow hairing on posterior four-fifths; bristles: 1 pair humerals, 2–4 pairs postsutural dorsocentrals, 1 pair postalars, 3–4 pairs irregular scutellars (a mixture of marginals and discals). Hind tibia with striking curvature at about basal third, here narrowed to at least half apical width.

Wing (similar to Fig. 3): Costa with outward curvature just prior to subcostal break. R_1 with serial setulae along most of length. R_{2+3} markedly curved apically, distance from costal margin at a maximum at about basal one-third, much closer to costal margin along apical two-fifths, insertion on costa short of wing apex, distance along costal margin between R_{2+3} and R_{4+5} about 1.4 times distance between R_{4+5} and M_1 . Crossvein r-m positioned about halfway along discal cell, meeting M_1 obtusely or at a right angle. First basal cell open anteriorly along basal four-fifths. Appendix of CuA_1 reasonably long, length two-thirds to three-quarters length of crossvein dm-cu. Anal cell with posterodistal corner receded.

Abdomen (Fig. 11): Vestiture comprises short, yellow setulae, this sparser and more elongate on basal two segments. Terminalia exerted and presumably rotated about 45° clockwise as in *R. ashleyi*. Sternite 1 not X- or V-shaped, mostly weakly sclerotised and without vestiture, basal margin slightly arched. T2 unusually elongate, being at least 1.5 times length of each of the other tergites. S5 laterally expanded, width about 2.0 times that of S4 in ventral view, lateral lobes extend upwards towards ventral margin of T5. Segment 6 represented only by reduced, symmetrical, slender, band-like S6.

Terminalia (Fig. 11): Epandrium small, displaced behind closely associated cerci and surstyli. Cerci appearing partially fused and with sparse, relatively elongate setulae. Surstylus positioned beneath cercus in profile, each a relatively elongate-ovoid lobe about 1.7 times length of cercus, connected posteriorly (behind cerci) by a slender strip, setulae over much of surface. Hypandrium reduced and weakly sclerotised (barely visible). Aedeagal apodeme very slender, about three-quarters length of epandrium. Distiphallus not evident (?detached). Ejaculatory apodeme relatively small, about one-quarter length of epandrium, narrow nodular region with broader, fan-like distal section.

Material examined: INDONESIA: ♀ Holotype: 'TYPUS' [Red card]; 'W.-SUMBA / Waimanggura / 15.8.1949 / Expedition / Bühler-Sutter' ['a/Licht.' handwritten on reverse of label] (NHMB). NIGERIA: 1♂, Zaria, Samaru, v.1978, J. C. Deeming, at light (NMWC).

Discussion: The extraordinarily wide distribution of *R. palpifera* is noteworthy. Further discussion and assessment of the distribution would be greatly enhanced once further biological data become available. In the interim it has to be assumed that *R. palpifera* is widespread in the Old World tropics (Australia excluded).

I am confident that the Nigerian male is conspecific with the female African material of *palpifera*, given that the wing patterning and venation (including the second basal cell) are identical, and that the male has similar pinkish body pigmentation and a comparable dark oval spot positioned anteroventrally on each side of T5. Sexual dimorphism in head facies and structure is marked. The male differs from the female as follows:

1. Frons narrower, about 0.8 times maximum dorsal eye width at mid-length (1.3–2.3 times in female);
2. Frons narrows posteriorly (broadens in female);
3. Bristles on vertex and posterior part of frons more strongly developed;
4. Mesofrons differentiated by shallow grooves on either side (frons without grooves in female);
5. Ommatidia enlarged postero-dorsally (not enlarged in female);
6. Arista simple, basal segments slightly broader, pubescent (dendritically branched in female, no main axis, although base substantially broader than in male, short plumose);
7. Facial carina present, slender above and broad, albeit flattened, on lower three-quarters, with epistome absent (low, sharply angled median facial ridge along entire depth of face, with weakly developed epistome in female);
8. Head much more strongly receded below, and cheek less extensive.

ACKNOWLEDGEMENTS

I would like to thank Dr J. Deeming (NMWC) for the extended loan of the *R. ashleyi* type material and the single male of *R. palpifera*, and for drawing my attention to it. I am grateful to the Foundation for Research Development (FRD) for continued financial assistance. Dr D. Yanega kindly reviewed an earlier draft of this paper. Mr A. Kirk-Spriggs provided me with information about the type locality of *R. ashleyi*. Ms S. Pryke capably assisted with the preparation of the illustrations. This paper represents the Results of Project Wallace No. 150, being based in part on material collected during Project Wallace, sponsored by the Indonesian Institute of Sciences and the Royal Entomological Society of London.

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